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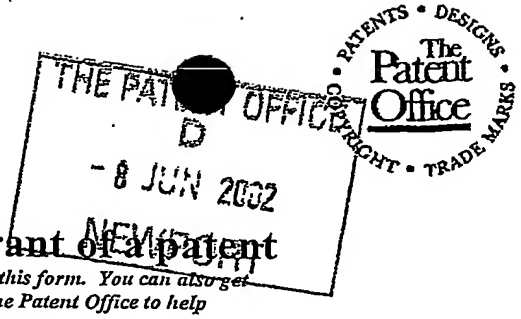

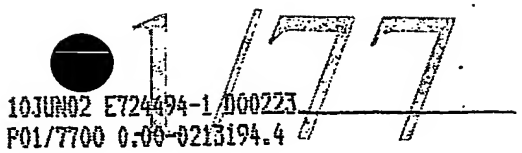

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P-UK-PR1080

2. Patent application number
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0213194.4

08 JUN 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Black & Decker Inc.
Drummond Plaza Office Park
1423 Kirkwood Highway
Newark, Delaware
USA

00341214004

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

Delaware, USA

4. Title of the invention

MITRE SAW WITH ADJUSTABLE FENCE

5. Name of your agent *(if you have one)*

Darrin M. Shaya

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Black & Decker
Patent Department
210 Bath Road
Slough
Berks SL1 3YD
United Kingdom

Patents ADP number *(if you know it)*

08399651001

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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11. I/We request the grant of a patent on the basis of this application

Signature D.M. Shaya Date: 06 June 2002

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DARRIN M SHAYA 01753 500804

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MITRE SAW WITH ADJUSTABLE FENCE

The present invention is directed to mitre saws and more particularly to power driven mitre saws where the angle between the cutting blade and the support fence is adjustable to provide for a wide range of cutting angles.

Power driven mitre saws of this type are well known and commonly used on building sites and by those involved in woodworking to allow for ease of cutting various lengths of wood to have required simple or complex (compound) cut angles. The basic type of mitre saw simply comprises a circular saw blade which is operable in a cutting plane substantially perpendicular to a work surface on which the workpiece to be cut is supported by an appropriate fence. The plane in which the blade is operable can then be angularly adjusted relative to the fence (which is fixed relative to the base of the mitre saw) to change the cutting angle relative thereto. Alternatively, such mitre saws may additionally further provide for the blade to be adjustably inclined relative to the work surface to provide for bevel cuts (or compound mitre cuts) whereby the blade is not only inclined in a first plane relative to the work surface (and thus the workpiece) but also has a second angular component relative to the fence. Such compound mitre cuts are commonly used for producing roofing joints. One further design variant of mitre saws allow the blade not only to be raised and lowered relative to the work surface but also, in the use of cross cut mitre saws, to be displaced longitudinally outwardly of such a work surface to produce a sliding compound mitre saw. However, in all such variants, the basic operation of the mitre saw remains constant, that is: the circular saw blade employed is operative in a first cutting plane relative to the work surface where this plane intersects the work surface at a first cutting line and this cutting line can be angularly inclined relative to a fixed fence on the mitre saw to define the appropriate mitre angle required. Typical prior art mitre saws comprise a fixed base assembly having a rotatable table or work surface, on which the adjustable saw blade securely mounted for corresponding rotation relative to the base and is also pivotally mounted so that a user can downwardly pivot the saw assembly to bring the blade towards this table, as shown in Figure 1. The base assembly has fixedly mounted thereon the mitre fence, so that the

table not only rotates relative to the base assembly but also relative to the fence. In this manner, since the cutting plane defined by the adjustable blade intersects the rotatable table assembly in a first cutting line, the cutting line of such blade can then be angularly inclined relative to the fence to select the mitre angle. Once a mitre angle has been selected the table is then releasably secured to the base unit to lock the saw the appropriate angle. One example of a mitre saw of this type is disclosed in the Applicants corresponding European Patent Application EP 0 949 048 showing a portable mitre saw of this type, although the same principle of operation is equably applicable on prior art stationary mitre saws employing larger work surfaces or bases.

However, whilst this type of conventional mitre saw provides for an efficient manner of adjusting the mitre angle, the mechanisms employed to provide for such a rotatable table releasably secured to a base assembly are somewhat complex and expensive to manufacture and service.

It is therefore an object of the present invention to provide a mitre saw with an alternative mechanism for varying the mitre angle which is more simplistic and less expensive to manufacture than current methods of adjusting the mitre angle on such saws.

Therefore, according to the present invention there is provided a mitre saw having an operable cutting blade supported relative to a work surface and displaceable in a first cutting plane wherein this cutting plane intersects the work surface along a first cutting line, the mitre saw further comprising an adjustable elongate fence angularly displaceable relative to this first cutting line, characterised in that the fence is mounted on and supported by the work surface so as to be angularly displaceable thereon relative to said cutting line. In this manner, the work surface is fixed relative to a support frame, removing the necessity of providing a rotatable table, such that the fence is mounted on this work surface and is adjustable relative thereto to vary the angle between the fence and the cutting line, and thus the blade. Such mitre saws may further comprise means for inclining the cutting plane relative to the work surface, as is conventional in mitre saws used for producing bevel cuts, whereby this cutting

plane still intersects the work surface along said cutting line and whereby the mitre angle is again varied by displacing the fence angularly with respect to this cutting line.

Preferably, the work surface will comprise a recessed channel along the first cutting line for accommodating the blade when the blade is displaced in this first cutting plane so as to pass through the cutting line. Preferably, the fence will comprise at least one releasable restraint member for restraining the fence to the work surface in a plurality of angularly adjusted orientations relative to the cutting line so that the user may selectively adjust the mitre angle required and lock the fence in the appropriate position. In addition, the present invention also provides for a mitre saw which allows the fence to be longitudinally adjusted along the cutting line so as to vary the operative cutting depth provided by such mitre saws. This feature is particularly beneficial for use with compound sliding mitre saws for cutting objects having varied thicknesses and depth.

Preferably, the fence itself will extend over the cutting line so as to support a workpiece either side of the cutting line during the cutting operation. Here, the fence will usually have a recess form therein for overlying the cutting line and, in particular, the recessed channel in the work surface, so as not to inhibit or engage the blade as it performs the cutting operation and passes through the work surface. As such, it is preferable that the fence will comprise at least two separate elongate sections, each presenting a support face extending perpendicular to the work surface in the same fence plane, with the recess here formed as a break between these two separate sections. At least one of the adjacent free ends of the separate sections of the fence are inclined longitudinally outwardly of this break so as to provide an inclined support surface to the object to be cut which accommodates the blade when the cutting plane is inclined relative to the work surface.

Where the fence comprises separated sections disposed either side of the cutting line, the separate sections are preferably interconnected by a rigid support element extending therebetween so as to be remote from the recess. Usually this rigid support

element will be substantially U-shaped extending out of the fence plane so as not to interfere with the blade in the cutting operation. Alternatively, this support element may extend substantially in the fence plane so as to be disposed below the work surface, again to avoid interference with the blade during the cutting operation. Alternatively, the separate sections of the fence may not be interconnected but may both be restrained in the same fence plane independently of one another, maintaining a constant angle of inclination of the fence relative to the cutting line.

It is preferable that the fence is pivotally mounted on the work surface about at least one pivot axis, wherein such a pivot axis is usually disposed substantially adjacent to the cutting line.

Preferably, the work surface will comprise at least one guide track and the fence will comprise at least one track following member in co-operative sliding engagement therewith, which facilitates the angular adjustment of the fence about the cutting line. In one embodiment, the track itself may be linear whereby it is therefore preferable that the or the at least one track following member is longitudinally adjustable along the elongate fence as the fence is pivoted about the pivot axis. Alternatively, or in combination, the work surface may in fact comprise at least two tracks and the fence comprise at least two track following members for co-operating engagement therewith. Again one or both of the track following members may be longitudinally adjustable about this elongate fence and the fence may optionally utilise a fixed pivot axis or may be simply inclined between the two tracks themselves relative to the cutting line.

Alternatively, the or all of the tracks may be arcuate, preferably disposed to be coaxial with the pivot axis where used. In this situation, the track following members may be securely fixed to the fence so as to follow the arcuate paths coaxial with the pivot axis. Alternatively, the fence may be pivotally mounted about the or at least one of the track following members and so to be both slideably adjustable relative to the cutting line in a longitudinal direction and also angularly displaceable thereabouts.

It is usual that the or at least one of the track follower means would form at least one of the releasable restraint members for restraining the fence to the work surface. Here it is usual that such releasable restraint members are rotatably adjustable to effect such engagement with the work surface, usually effecting screw threaded engagement with a washer or nut member disposed within the track so as to exert a compressive force on the work surface disposed between such washer and the fence.

In an alternative embodiment of the present invention, such mitre saws may employ work surfaces comprising an array of first engagement means for co-operative releasable engagement with at least one second engagement means on the fence for restraining the fence on the work surface at a pre-determined angular inclination relative to the cutting line, wherein engagement of the second engagement means with a different one of the array of first engagement means restrains the fence in a second pre-determined angle relative to the cutting line. Usually the first engagement means will comprise an array of holes in the work surface and the second engagement means will comprise at least one projection member for engagement with one of the array of holes to effect appropriate angular alignment relative to the cutting line. Such projection members may comprise elongate members for co-operating engagement in corresponding angularly inclined (relative to cutting line) elongate slots, or may further comprise a plurality of projections for engagement with a plurality of holes to define the angular orientation, wherein the holes are appropriately positioned on the work surface so that engagement therewith would facilitate an appropriate angular inclination relative to the cutting line. It is usual that the projection members may be longitudinally adjustable along the fence.

A preferred embodiment of the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings in which:

Figure 1 shows a mitre saw according to the prior art; and

Figure 2 shows a mitre saw according to the present invention; and

Figure 3 is a plan view from above of the mitre saw of Figure 2, illustrating an adjustable fence; and

Figure 3a is a cross sectional view of the fence of the mitre saw of Figure 3 along the lines III-III illustrating a fence restraint member; and

Figure 4 illustrates a second embodiment of an adjustable fence according to the present invention; and

Figure 5 is a schematic illustration showing relative angular inclination of the cutting plane relative to the work surface of the mitre saw of Figure 2.

Figure 1 shows a conventional mitre saw according to the prior art. This mitre saw (10) comprises a fixed base assembly (12) having rotatably mounted thereon a table or work surface (14). Securely fixed to the rotatable work surface (14) is a saw assembly (16) which basically comprises a handle (18) (usually comprising a trigger switch, not shown) together with a motor housing (20) housing an electric motor (either mains operated or battery operated) with a conventional bearing assembly and output for driving a circular saw blade (22), which is shown here housed behind an automatically adjustable blade guard (24). The entire saw assembly (16) is mounted on a conventional hinge arrangement (26) so as to pivot about an axis (A), so as to pivotally displace the saw blade (22) towards the work surface (14) in a first cutting plane (5). Again, as is conventional for mitre saws of this type (and, as such, will not be described in great detail herein), the adjustable blade guards (24) are automatically displaced about the circumference of the blade housing (25) as the saw assembly (16) is pivotally displaced towards the table (14), so as to expose the rotating circular saw blade (22) as it approaches this work surface and a workpiece mounted thereon.

The flat circular saw blade (22) defines a first cutting plane (5) through which pivotal displacement of the saw (16) moves the blade (22). The plane in which this flat blade itself lies, perpendicular to axis A, is defined as the cutting plane and is represented by the plane through which the blade itself is pivotally displaceable and shown illustratively in Figure 1 as plane (5). This cutting plane subsequently intersects the work surface or table (14) along a cutting line illustrated by the line X-X in Figure 1 and along which cutting line X-X the table is provided with a elongate groove or channel (30) which will accommodate the circular saw blade as it is

pivotally displaced into cutting engagement with a workpiece placed on this work surface.

The mitre saw (10) further comprises a fence assembly which comprises two separate sections (34a, 34b) each rigidly secured to the base member (12), and restrained from rotation thereto. This fence assembly (32) presents a workpiece supporting portion against which a workpiece (such as a length of timber) may be disposed and held firm during the cutting operation. This fence (32) further comprises a gap or recess (36) overlying the cutting line X-X so as not to inhibit or engage the rotating saw blade during the cutting operation. As illustrated in Figure 1, the adjacent end faces (38a and 38b) of the fence disposed either side of this recess (36) may be either vertical (38a) (where the saw blade (22) is to be maintained in a cutting plane which is not angularly adjustable relative to the work surface) or alternatively, if the mitre saw is a compound mitre saw, whereby the hinged connection of the saw assembly (16) is rotatable (so as to incline the axis (A) and thus the angle of inclination of the cutting plane relative to the work surface (as will be described below)) then the end face (38b) of the fence (34a) is inclined so as to facilitate operation of and accommodate the blade when in such an inclined cutting plane relative to the work surface (14).

The mitre saw (10) of Figure 1 illustrates a mitre saw orientated for cutting at right angles. Here the cutting line X-X is disposed substantially at an angle α of 90° relative to the fence (34) so as to provide a right angled cut through a workpiece placed on this saw adjacent to the fence as the saw blade (22) is pivotally lowered into engagement therewith.

In order to vary the mitre angle of cut of such saw, the rotatable table or work surface (12) is rotated relative to the fixed base assembly by releasing a fixing mechanism (40) between the rotatable table (14) and the base station (12). In the prior art example of Figure 1, a rotatable screw threaded engagement member (40) provides a releasable locking mechanism between two work surfaces and the base. As is conventional in the art, rotation of this work surface (14) in the direction shown

generally by arrows B in Figure 1 effects angular displacement of cutting line X-X relative to the fixed base (12) and hence fixed fence (34), thereby varying the angle α therebetween and hence the mitre cutting angle. The work surface is provided with an indicia marking (44) which is read against a fixed angular scale (or indicia) (46) on the base (12) to determine the exact angle α between the cutting line X-X and the fence (34). In this manner, the operator can pre-select the required mitre angle by adjustment of the rotatable work surface until the correct angular alignment is achieved, and the rotatable work surface then secured in engagement with the base station (12) at this pre-determined angle.

Whereas the prior art mitre saw (10) shown in Figure 1 is a portable mitre saw, in that it has a reduced size working surface (14) and base assembly (12), (which base assembly may receive detachable legs), Figure 2 shows a table mitre saw (110) (which again is portable or may be used as a stationary unit) which adopts the similar principle of mitre saw operation to that used in portable mitre saws (10) of the type shown in Figure 1. In this respect, it is to be appreciated that the invention is equally applicable to both portable mitre saws and table mitre saws.

Referring now to Figure 2, showing the present invention, the table mitre saw (110) again comprises a saw assembly (116) having a handle (118) with a trigger switch (119) attached to a motor housing (112) which is connected through a bearing assembly (not shown) to a circular saw blade (122) mounted within a blade housing (125) and surrounded by a displaceable blade guard (124). This saw assembly (116) is mounted on a table or working surface (114) which is securely mounted on four sturdy legs (117) to provide a stationary mitre saw (however whilst the work surface (114) here is mounted on legs (117), the current invention is equally applicable to a portable mitre saw of the type shown in Figure 1 whereby in such a situation the work surface (14) of Figure 1 would be integral and fixed with respect to the base station (12)). Again, the saw assembly (116) is pivotally mounted about an axis (A) through a conventional hinge arrangement so as to allow pivotal displacement of the saw

blade towards the work surface (114) about this axis (A), as described with reference to Figure 1.

The work surface (114) has an elongate recess or groove (130) for accommodating the circular saw blade as it passes through the upper surface of this work surface (114). The saw (116) in this example is operated and controlled via a power box (135) receiving power input from a mains source. As in the prior art embodiment of Figure 1, the circular saw blade (122) is also operative and rotatable in a first cutting plane which intersects with the work surface (114) along a cutting line shown again as X-X in Figure 2. The saw (110) further comprises an adjustable fence member (134), which fence member is pivotally adjustable over the surface of the work surface (114) so as to vary the angle between this fence (134) and the cutting line X-X as will be more readily understood with reference to Figure 3.

Figure 3 shows a schematic plan view from above of the mitre saw (110) of Figure 2 having the saw assembly (116) removed. The engagement between the saw assembly (116) and the work surface (114) is shown schematically at (150), showing the pivot axis (A) disposed at right angles to the cutting line X-X.

As can be seen from Figures 2 and 3 the saw assembly (116) and work surface (114) are secured relative to one another and are fixed relative to the base (in this situation legs (117)) so as to be non rotatably mounted thereon. Instead, the fence (134) is mounted on the work surface (114) to be angularly adjustable relative thereto, and adjustable relative to the cutting line X-X.

Since the pivot axis A (about which the circular saw blade is able to pivot) is now fixed relative to the work surface (114) then the cutting plane (as previously described), is also fixed relative to the work surface (114) and is considered to be represented by a plane extending out of the paper, so as to be perpendicular thereto, along the line X-X of Figure 3.

Here the fence (134) is substantially L-shaped in cross section (Figure 3a and Figure 2) comprising an upright workpiece engaging face (152), lying in a fence plane extending substantially perpendicular to the work surface, and has a rear stabilising flange (153) which lies against the work surface (114). Again, the fence (134) is divided into two separate sections (134a and 134b) forming a channel or recess (136) therebetween, similar to the recess formed in the fence (34) of Figure 1. As will be appreciated from the Figures, this recess (136) overlies the recessed channel (130) of the work surface (114) (and hence the cutting line X-X) and so allows for the saw blade to pass between the fence without engagement therewith.

In this embodiment of the current invention, the two distinct sections (134a,134b) of the fence are interconnected by a substantially U-shaped rigid support element (157) (Figure 3), which U-shaped support (157) is disposed rearwardly of the engaging face (152) and remote from the aperture (136) so as not to interfere with the saw blade during operation of the mitre saw. Alternatively, this U-shaped support section could be formed so as to pass through the table and underlie both the table (114) and the channel (130) again so as to not interfere with the saw blade in operation. In such an alternative embodiment, the faces (152) of the fence (134) define a substantially perpendicular plane to the work table (114) (fence plane) whereby the support member (157) would then lie substantially in this fence plane. The main function of the support member (157) is to restrain the two separate sections (134a and 134b) from relative angular or longitudinal displacement to one another so that their faces (152) are maintained substantially co-planar in this fence plane.

The fence (134) (and fence plane) is angularly displaceable relative to the cutting line X-X (angle β). This angular adjustment is achievable by a variety of methods and techniques all of which are considered to fall within the scope of the current invention. The preferred embodiment shown in Figure 3 requires the fence (134) to be pivotally attached via a pivot member (163) having a pivot axis extending perpendicular to the work surface (114), which is disposed on the inner end of fence member (134b), with the fence being rotatably displaceable about such pivot member. The pivot member comprises a pin member extending through the fence (134) into a

corresponding aperture within the table (114). The second fence section (134a) is further provided with a restraint member (165) which passes through this fence section for co-operative engagement with the work surface (114) to releasably engage therewith to secure the adjustable fence (134) in its desired angular orientation. This restraint member (165) (shown more clearly in Figure 3a) comprises a rotatable knurled knob (167) having an elongate screw threaded section (169) for co-operative screw threaded engagement with a nut member (171) slideably received within a longitudinally extending undercut slot (173) formed within the work surface (114). The nut member (171) is slideably displaceable within this undercut slot (173) but restrained from rotational displacement therein (ie. such as by use of a hexagonal or square nut which engages the side walls of such slot). Such an arrangement is conventional and it will be appreciated that when the restraint member is rotated clockwise so as to effect screw threaded arrangement between the projection (169) and the nut (171), the nut (171) is forced upwardly along the length of the projection (169), thereby engagement with the shoulders (175) of the undercut slot (173), resulting in a compressive force being applied between the nut and the knob (167) thereby compressing the fence (134) into engagement with the table to frictionally restrain the fence in engagement therewith. When the knob is rotated in an anti clockwise direction such compressive force is relieved allowing the restraint member (165) to be slideably displaceable along the channel (173) as the fence (134) is pivoted about pivot point (163) to change the angular displacement β between the fence (134) and the cutting line X-X. The fence section (138) further comprises an elongate aperture (180) for accommodating the restraint member (165) to allow the restraint member (165) to be longitudinally displaceable along the fence member (134a) to compensate for the longitudinal displacement of the fence member (134a) relative to the channel (173) during the pivotal displacement about pivot point (163). Figure 3 also illustrates that the work surface (114) may be further provided with indicia markings (181) defining appropriate angular configurations β to allow the user to correctly set angle β as required by aligning the fence (34) with such markings.

The current invention further provides for longitudinal adjustment of the fence (134) longitudinally along the cutting line X-X. Since the fence (134) is simply pivotally engaged with the work surface (114) by use of a pin member through the pivot point (163) then, by longitudinal adjustment of this pivot axis, in a direction parallel to the cutting line X-X and subsequent engagement with an alternatively longitudinally displaced hole (183) then the entire fence (134) can be displaced along the line X-X and again pivotally operated in the manner previously described. This longitudinal adjustment of the fence provides an additional advantage of allowing different sized workpieces to be cut. Additionally, the indicia (181) may be reset so as to be correctly aligned with the alternative pivot axis position (183) to again ensure the user is able to correctly determine angle β by use of such indicia being aligned with the fence plane. The longitudinal adjustment of the fence may be particularly beneficial when used in conjunction with a sliding compound mitre saw.

It will also be appreciated that whilst the pivot point (163) is shown substantially adjacent to the cutting line X-X, this pivot axis could be alternatively displaced anywhere along the length of the fence section (134b) provided that the aperture (136) is sufficiently large to prevent either of the fence sections (134a and 134b) overlying the cutting line X-X in any one of the desired angular settings β.

Figure 4 shows an alternative arrangement of an adjustable fence mechanism for use with the mitre saw (110) of Figure 2 whereby the pivot axis (163) of the embodiment shown in Figure 3 is removed and both sections (134a and 134b) of the fence (134) are provided with restraint means (165) with corresponding, longitudinally extending apertures (180) (as previously described with reference to Figure 3)). Both restraint members (165) co-operate with corresponding longitudinally extending slots (173) formed in the work surface (114) in the manner previously described with reference to Figure 3. In this situation, the fence is slideably adjustable along both slots (173) by releasing the restraint members (165), allowing the fence plane to be aligned between two sets of indicia (181) designating the appropriate mitre angle (one each associated with each slot (173)), with the

operator ensuring that the recess (136) overlies the cutting line X-X. Again for this embodiment, the fence (134) is longitudinally displaceable along the cutting line X-X by appropriate displacement along the channels (173), whereby the indicia associated with each channel (173) may also be displaceable and reset in this longitudinal direction to allow correct determination of the angle β. Once the appropriate angle β has been determined by alignment of the fence (134) with the appropriate indicia, both of the restraint members (165) may then be engaged to restrain the fence (134) in that desired position.

The current invention is also applicable to compound mitre saws whereby the cutting plane in which the circular saw blade is operable, is angularly adjustable relative to the work surface (114). This is clearly shown in Figure 5 showing a schematic cross section through the mitre saw (110) of Figure 2, schematically illustrating the cutting plane (300) when the blade (122) is in the position shown in Figure 2 and disposed substantially at right angles to the work surface (114), wherein the blade is vertically displaceable into and out of engagement with a workpiece mounted on the table (114) (shown generally by arrow (302)). However, if the blade (122) is angularly adjusted to a second cutting plane (304) (as is conventional in compound mitre saws) it will again be appreciated that this cutting plane (304) will intersect the work table (114) along the same cutting line X-X, although the cutting plane will be angularly disposed relative to the work surface (114). However, since the fence (134) is angularly adjustable on the work surface (114) relative to the cutting line X-X then its effectiveness will not be affected by angular inclination of the cutting plane (304). Figure 5 also illustrates the benefit of providing the cutting fence with inclined edges (386) adjacent to the recess (136) to accommodate such an inclined cutting plane so that the fence (134) will not interfere or engage the blade (122) as it is displaced towards the work surface (114) along this inclined cutting plane (304).

It will be appreciated that there are many variations to the specific embodiments described herein which still fall within the general scope of the current invention, where the fence of such a mitre saw is angularly adjustable relative to a fixed work

surface (114). In particular, the slots (173) shown in Figures 3 and 4 need not be parallel to the cutting line X-X and may in fact be arcuate (and, in Figure 3, co-axial with the pivot point (163)) with the associated restraint member (165) thereby secured from longitudinal displacement on the fence (134) and simply able to follow the pre-defined arcuate path when undergoing angular displacement.

In addition, whilst the preferred embodiment has described the restraint members (165) being slideably adjustable along slots (173) an alternative embodiment to that shown in Figure 3 may employ an engagement mechanism mounted on the fence (134) which is only co-operable with the table at pre-determined angular positions (for example every 5°). An example of this embodiment employs the use of a spring biased projection member, biased towards engagement with the work surface (114), for co-operable engagement with an array of apertures formed therein at pre-determined angular orientations. Thus to effect a change of angle β a spring biased member is lifted out of engagement with one such hole or aperture in the work surface (114), whereby subsequent angular adjustment of the fence (134) about the axis (163) displaces such spring biased projection until it overlay a further hole in the work surface, and released into engagement therewith. Again such holes in the work surface could be arrayed along an arcuate path coaxial with the axis (163) or alternatively the spring bias projection could be slideably mounted on the fence (134) with the array of holes being substantially linear and parallel to the cutting line X-X. Each hole would be representative of a pre-determined angular adjustment of β.

Also, whilst it is preferable to rigidly interconnect to the two sections (134a and 134b) of the fence (134) by use of the support element (157), this is not essential to the operation of the invention. It is envisaged that both of the sections (134a and 134b) could be independently adjustable on the work surface (114). One example of such a configuration would be for each section (134a, 134b) to have, as a restraint member, an elongate downwardly extending projection for complimentary co-operation with elongate slots formed within the work surface at pre-determined orientations to the cutting line which will automatically align the two fence sections

(134a, 134b) at pre-determined angular orientations relative to the cutting line X-X. Alternatively, it is possible that both separate sections (134a and 134b) could each employ two restraint members (165) both located in the same slots (180) and each engageable with two parallel channels (173) to provide for angular adjustment of the fence plane by alignment with pre-determine indicias marked on the work surface (114).

Still further, where the two sections (134a and 134b) of the fence (134) are not interconnected and are thus independently adjustable on the work surface (114) it would also be possible for each of these two sections to be disposed at completely different angles relative to the cutting line X-X. Here, for example, each section may be disposed at 45° to the cutting line X-X so as to form a substantial right angle between the two fence members which would allow the accurate positioning of a right angled workpiece relative to the cutting line X-X.

Whilst the preferred embodiment herein described relates to mitre saws having circular saw blades, the current invention is equally applicable to mitre saws having power driven linear reciprocating blades which are displaceable towards the work surface in the previously described cutting plane.

Finally, the restraint means (165) described in the examples shown herein are by way of reference only and it is well understood and known within the art to provide many alternative forms of releasable engagement means for restraining adjustable articles to a work surface, all of which are considered to be incorporated within the current invention.

CLAIMS

1. A mitre saw having an operable cutting blade supported relative to a work surface and displaceable in a first cutting plane wherein said cutting plane intersects said work surface along a first cutting line, said mitre saw further comprising an adjustable elongate fence angularly displaceable relative to said first cutting line; characterised in that said fence is mounted on and supported by said work surface so as to angularly displaceable thereon relative to said cutting line.

2. A mitre saw as claimed in claim 1 wherein said cutting blade is adjustable so as to adjustably incline the cutting plane relative to the work surface.

3. A mitre saw as claimed in either of the preceding claims wherein said work surface is non-adjustably mounted on a support frame.

4. A mitre saw as claimed in any one of the preceding claims wherein said work surface comprises a recessed channel along said first cutting line for accommodating said blade when displaced in said first cutting plane.

5. A mitre saw as claimed in any one of the preceding claims wherein said fence comprises at least one releasable restraint member for restraining said fence to said work surface in a plurality of angularly adjusted orientations relative to said cutting line.

6. A mitre saw as claimed in any one of the preceding claims wherein said fence is longitudinally adjustable along said cutting line.

7. A mitre saw as claimed in any one of the preceding claims wherein said fence extends over said cutting line.

8. A mitre saw as claimed in claim 7 wherein said fence comprises a recess for overlying said cutting line in said work surface.

9. A mitre saw as claimed in claim 8 wherein said fence comprises at least two separate elongate sections each presenting a support face extending perpendicular to said work surface in the same fence plane, with said recess formed by a break between said separate sections.

10. A mitre saw as claimed in claim 9 wherein at least one of the adjacent free ends of said separate sections is inclined longitudinally outwardly of said break so as to accommodate said blade when said cutting plane is inclined relative to said work surface.

11. A mitre saw as claimed in either claim 9 or claim 10 wherein said separate sections disposed either side of said cutting line are interconnected by a rigid support element extending between said sections remote from said recess.

12. A mitre saw as claimed in claim 11 wherein said support element extends outside of said fence plane.

13. A mitre saw as claimed in any one of the preceding claims wherein said fence is pivotally mounted on said work surface about at least one pivot axis.

14. A mitre saw as claimed in any one of the preceding claims wherein said work surface comprises at least one guide track and said fence comprises at least one track follower member in cooperative sliding engagement therewith.

15. A mitre saw as claimed in claim 14 wherein said work surface comprises at least two tracks and said fence comprises at least two track follower members for respective cooperating engagement therewith.

16. A mitre saw as claimed in claim14 or claim 15 wherein the or at least one track follower member is longitudinally adjustable along said elongate fence.

17. A mitre saw as claimed in any one of claims 14 to 16 wherein the or at least one track is linear.

18. A mitre saw as claimed in any one of claims 14 to 16 in which the or at least one track is arcuate.

19. A mitre saw as claimed in any one of claims 14 to 18 when appended to claim 13 wherein the fence is pivotally mounted about the or at least one of said track follower members

20. A mitre saw as claimed in claim 13 or any one of claims 14 to 18 when appended to claim 13 wherein said pivot axis is fixed between said fence and said work surface.

21. A mitre saw as claimed in any one of claims 14 to 19 when appended to claim 5 wherein the or at least one of said track follower means forms said at least one releasable restraint member.

22. A mitre saw as claimed in claim 21 wherein said releasable restraint member is rotatably adjustable to effect engagement with said work surface.

23. A mitre saw as claimed in any one of claims 1 to 11 wherein said work surface comprises an array of first engagement means for cooperative releasable engagement with at least one second engagement means on said fence for restraining said fence on said work surface at a predetermined angular inclination relative to said cutting line, wherein engagement of said second engagement means with a different one of said array of first engagement means restrains said fence in a second predetermined angle relative to said cutting line.

24. A mitre saw as claimed in claim 23 wherein said first engagement means comprises an array of holes in said work surface and said second engagement means

comprises at least one projection member for engagement with one of said array of holes.

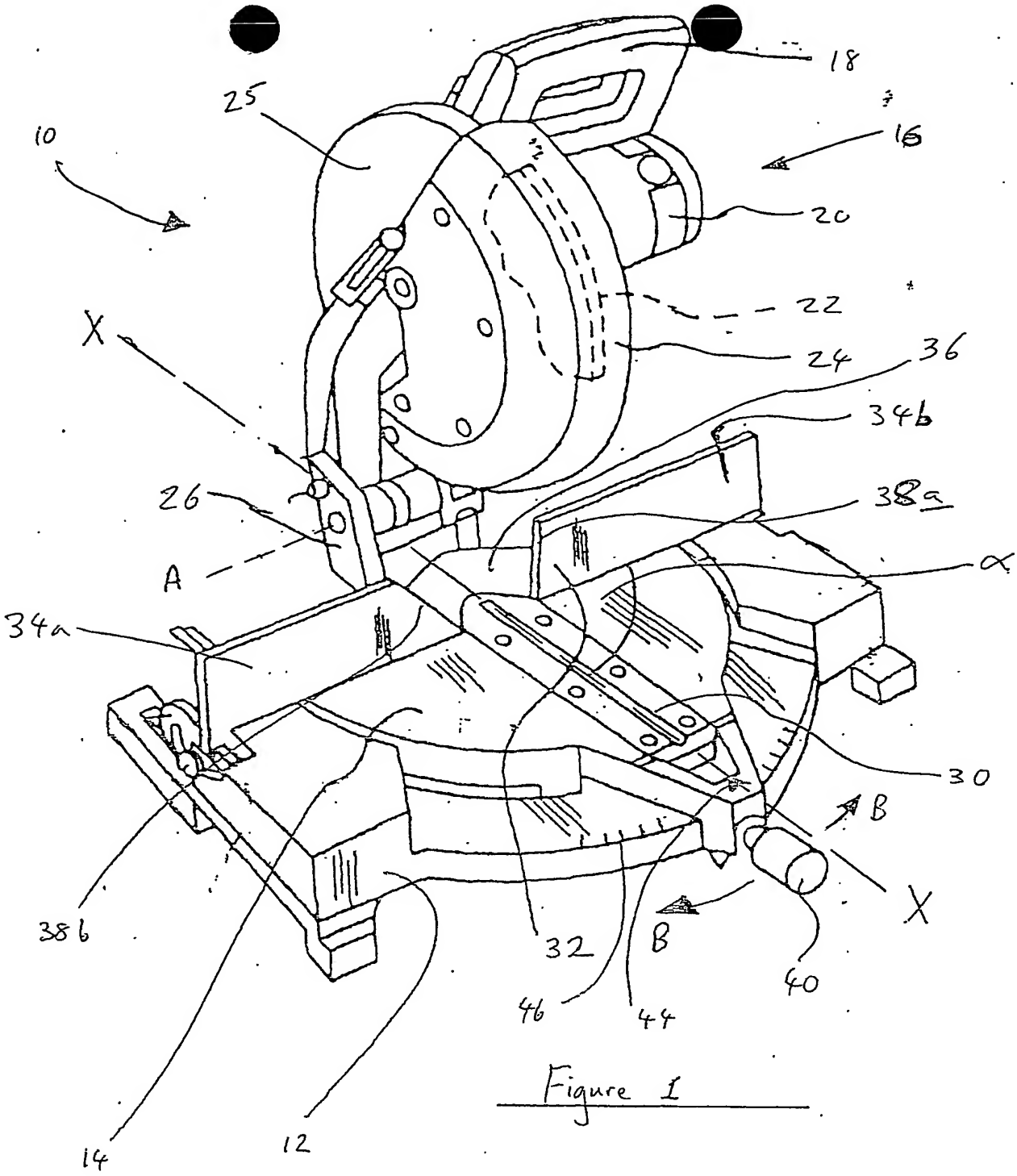
25. A mitre saw as claimed in claim 24 wherein said projection member is longitudinally adjustable along said fence.

26. A mitre saw substantially as herein described with reference to the accompanying drawings.

ABSTRACT

MITRE SAW WITH ADJUSTABLE FENCE

A mitre saw (110) having an operable cutting blade (122) pivotally supported relative to a work surface (114) and displaceable in a first cutting plane which intersects the work surface along a first cutting line (X-X), further comprising an adjustable elongate fence (134) angularly displaceable relative to the first cutting line X-X whereby the fence is adjustably mounted on and supported by the work surface (114).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10
16
20
22
X
24
36
34b
26
38a
A
α
34a
30
B
X
38b
32
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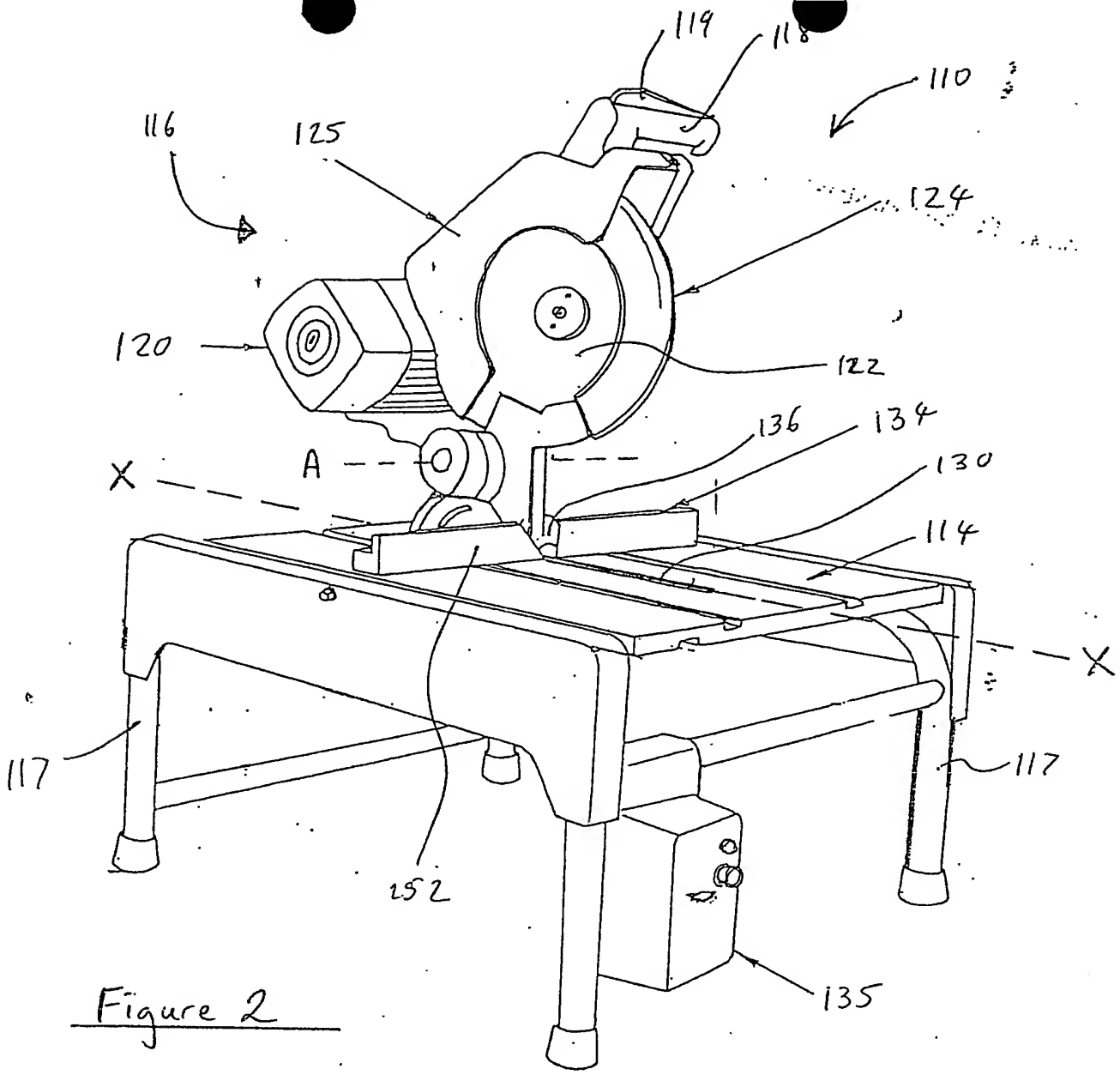
40
46
44
14
12

Figure 1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118
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116
125
124
120
122
136
134
A
X
130
114
X
117
117
252
135

Figure 2

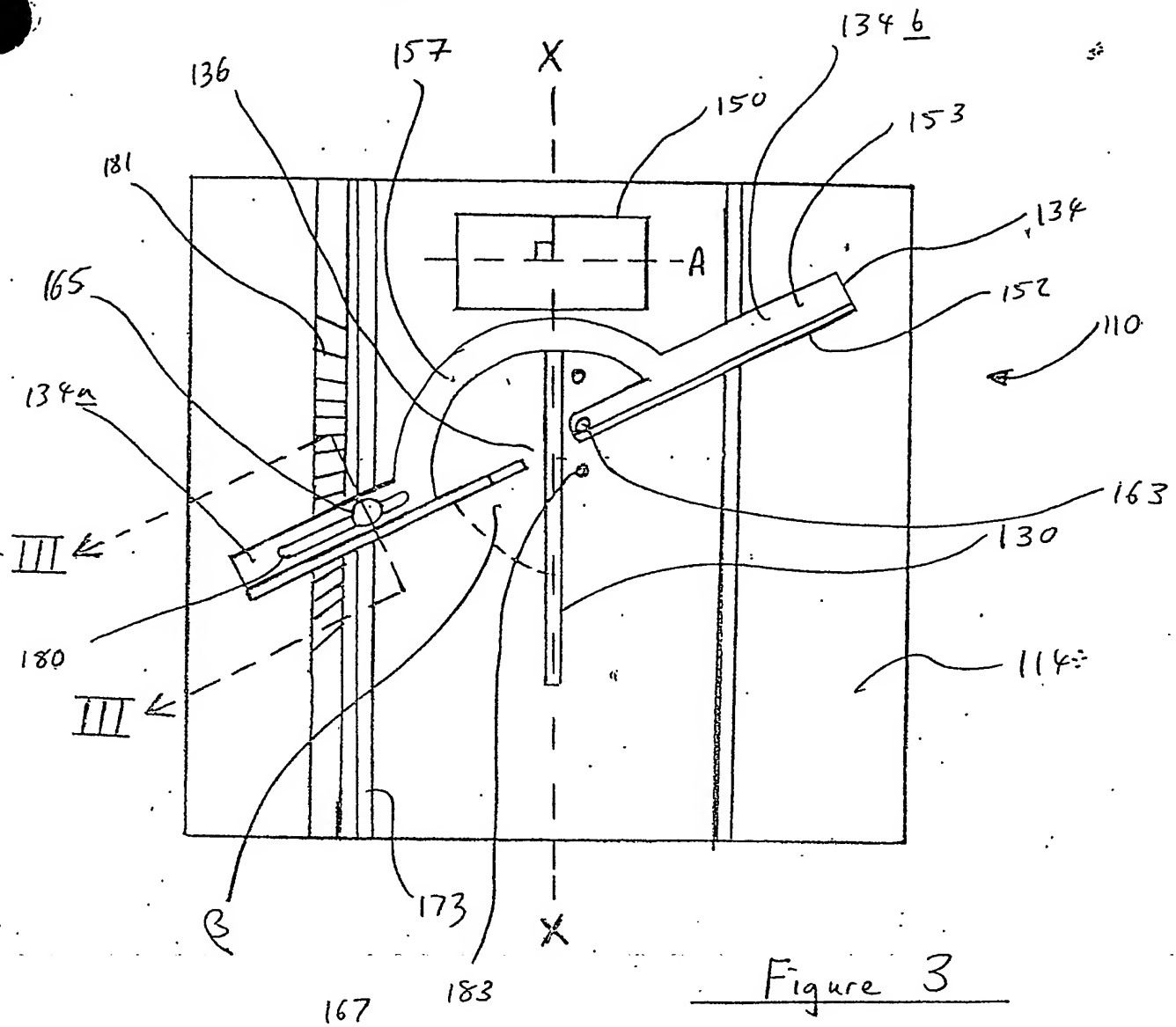

Figure 3

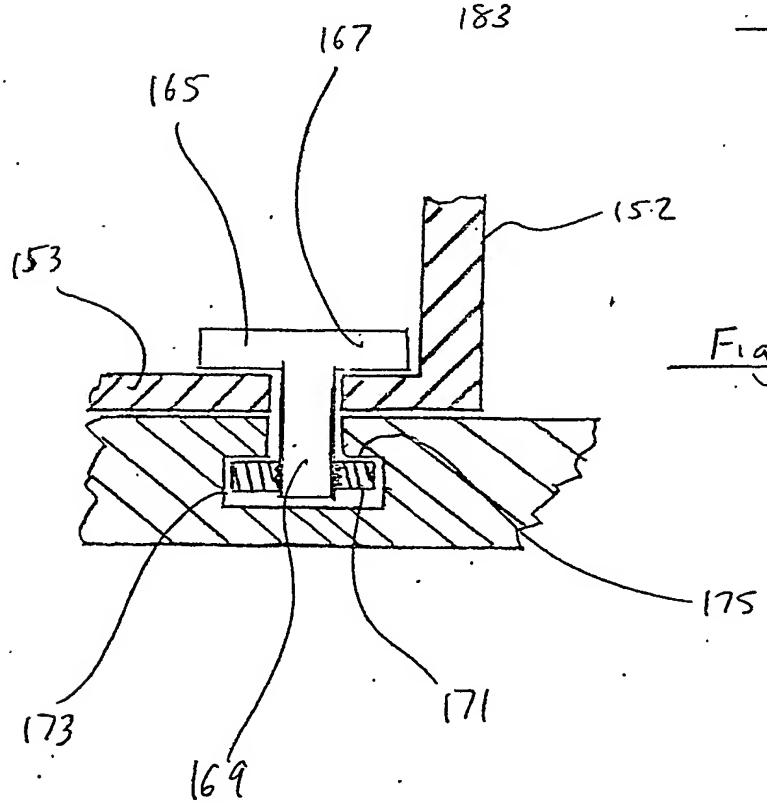

Figure 3a

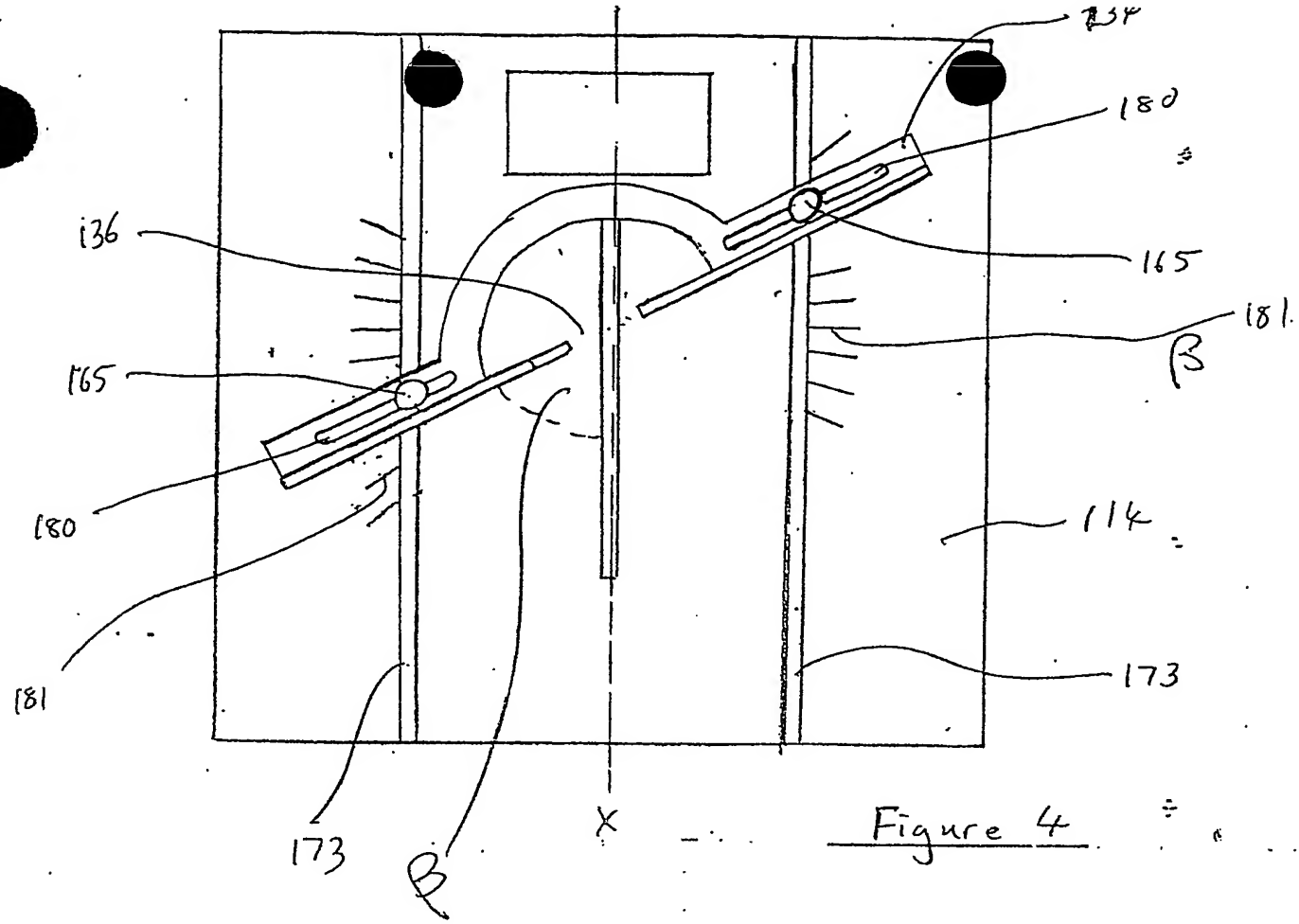

Figure 4

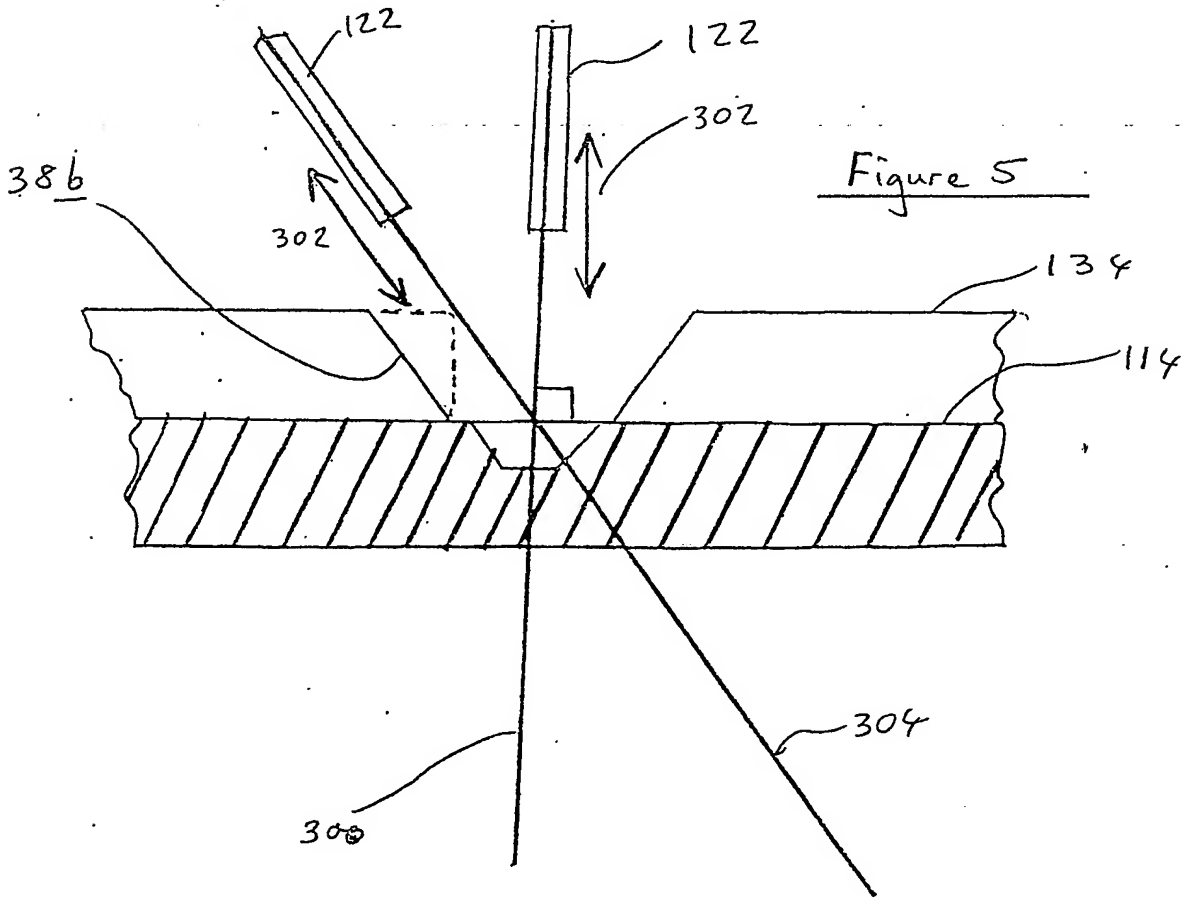

Figure 5